



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

re Application of:

Ting-Hui Huang

Group Art Unit: 2871

Examiner: Zhi Qiang Qi

Serial No.: 09/273,691

Filed: March 22, 1999

For: Front-Side Repairable TFT-LCD and Method for Making

Attorney Docket No.: 64,600-039

**EXPRESS MAIL CERTIFICATE**

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Kathy Dixon

**APPEAL BRIEF**

Box Appeal  
Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Appellant appeals in the captioned application from the Examiner's final rejection, dated January 15, 2002, of claims 1-5, 7-18 and 20-22 under 35 USC §103(a) as being unpatentable over Kim et al '948, Kim '341 and Fujikawa et al '178.

It is urged that the rejection be reversed and that all the claims be allowed.

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(1) REAL PARTY IN INTEREST

The real party in interest in the present appeal is the recorded Assignee of Industrial Technology Research Institute.

(2) RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences that are known to the Appellant, the Appellant's legal representative, or the assignee.

(3) STATUS OF CLAIMS

Claims 1-5, 7-18 and 20-22 are pending in the application.

Claims 1-5, 7-18 and 20-22 stand rejected.

(4) STATUS OF AMENDMENTS

A Request For Reconsideration was filed on or about March 15, 2002 which does not contain any claim amendments.

An Advisory Action mailed March 28, 2002 by the Examiner which maintained the rejection of claims 1-5, 7-18 and 20-22.

A Notice of Appeal was filed on or about April 4, 2002.

(5) SUMMARY OF THE INVENTION

The invention is directed to a TFT-LCD assembly which can be laser repaired from the front-side of the assembly and a method for making the front-side repairable TFT-LCD assembly.

(Specification, page 1, lines 3-5)

In a preferred embodiment, a front-side repairable TFT-LCD assembly is provided which includes a TFT-LCD equipped with a first multiplicity of buslines, at least one repair line positioned outside of and in parallel with circuitry on the TFT-LCD, the at least one repair line intersects the first multiplicity of buslines with an insulating layer thereinbetween, and a black matrix film coated on a glass substrate positioned juxtaposed to the repair lines and buslines, the black matrix film has a second multiplicity of apertures formed therein each corresponding to a location where one of the at least one repair line intersects the first multiplicity of buslines allowing a laser to pass therethrough.

(Specification, page 10, lines 1-8)

The invention is further directed to a method for fabricating a front-side repairable TFT-LCD assembly by the operating steps of first providing a TFT-LCD equipped with a first multiplicity of buslines, providing at least one repair line laid out around a circuitry on the TFT-LCD, the at least one repair line

intersects the first multiplicity of buslines with an insulating layer thereinbetween, coating a black matrix film on a glass substrate used as a cover plate for the TFT-LCD, patterning the black matrix film and forming a second multiplicity of apertures therein each corresponds to a cross-over point where one of the at least one repair line intersects the first multiplicity of buslines and mounting the glass substrate which has the black matrix film patterned with a second multiplicity of apertures on the TFT-LCD as a cover plate.

(Specification, page 11, lines 1-9)

(6) ISSUE

Is the rejection of claims 1-5, 7-18 and 20-22 are rejected under 35 USC §103(a) over Kim et al '948, Kim et al '341 and Fujikawa et al '178 proper when such references do not teach or suggest the specifically claimed limitations in the present application?

(7) GROUPING OF CLAIMS

The rejection of claims 1-5, 7-18 and 20-22 are contested as a group.

(8) ARGUMENTS

Claims 1-5, 7-18 and 20-22 are rejected under 35 USC §103(a) as being unpatentable over Kim et al '948, in view of Kim et al '341 and Fujikawa et al '178.

In the "Examiner's Response to Applicant's Only Arguments" section of the 1/15/02 Office Action (at page 6), the Examiner contends:

"(1) Kim's 341 discloses (col. 3, lines 12-28, and Fig. 2) that the black matrix (20) is formed by appropriately patterning a light-shielding layer using a conventional photolithography process to define the aperture area (i.e., formation of openings that are directly over the cross point), so that the laser beam can pass the aperture to perform the repair for the buslines, and the laser beam will heat the wires for welding a repair line to a busline or for severing the shorts."

Kim '341 is the primary reference, or the only reference, that the Examiner relied upon for teaching "defining an aperture area in a black matrix layer and forming openings directly over the cross point of a repair line and a busline, i.e. the key elements

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of the present invention. For instance, the present invention independent claim 1 recites:

"Claim 1. A front-side repairable TFT-LCD assembly comprising:

a TFT-LCD equipped with a first multiplicity of buslines,

at least one repair line positioned outside of and in parallel with a circuitry on said TFT-LCD, said at least one repair line intersects said first multiplicity of buslines with an insulating layer thereinbetween, and

a black matrix film coated on a glass substrate positioned juxtaposed to said repair lines and buslines, said black matrix film having a second multiplicity of apertures formed therethrough each corresponding to a location where one of said at least one repair line intersects said first multiplicity of buslines allowing a laser to pass therethrough for welding a repair line to a busline."

The Appellant respectfully submits that, the Kim '341 reference and specifically Fig. 2 and col. 3, lines 12-28 that the Examiner relied upon, contains teachings that are completely unrelated to the present invention.

Fig. 2 of Kim '341 shows a liquid crystal device that has an aperture area, a color filter 21a, an electrode layer 23, a thick liquid crystal layer in-between the electrode layer 23 and the protective layer 6, and a pixel electrode 4. The apparatus is sandwiched in-between an upper glass layer 101 and a lower glass layer 100. The **aperture** shown by Kim in Fig. 2 is a LCD display window that is equipped with a color filter 21a and a liquid crystal filling between the two glass plates. The fact that Kim discusses aperture ratio (col. 6, lines 61-62) further indicates that the aperture is for a LCD cell for display of images and **not for repair**.

To the contrary, the present invention structure, as shown in Figs. 3 and 4, clearly does not contain a liquid crystal layer between the two glass plates. As recited in independent claim 1, "at least one repair line positioned **outside of** and in parallel with a circuitry on **said TFT-LCD**". The repair line taught by the present invention is thus positioned outside of the LCD

area, contrary to that shown by Kim. As a matter of fact, in the structure shown by Kim in Fig. 2, it would not have been possible to irradiate a laser beam **through the liquid crystal layer** to effect a repair by welding two metal layers together. In the section of Kim '341 recited by the Examiner, i.e. col. 3, lines 12-28, neither the word "repair" nor the words "irradiating a laser beam to effect a repair" can be found. The apertures provided in the black matrix film of Kim '341 therefore, has nothing to do with repair as taught by the present invention.

The Appellant further submits that the provision of apertures in a black matrix film to effect a repair is further not taught, disclosed or suggested by Kim '948 or Fujikawa.

The rejection of claims 1-5, 7-18 and 20-22 under 35 USC §103(a) based on Kim '948, Kim '341 and Fujikawa '178 is improper and must be reversed.

#### CLOSING

In summary, the Appellant has shown that his claimed invention is fully supported by a body of evidence of non-obviousness. It is therefore respectfully submitted that such evidence of non-obviousness overcomes any showing of obviousness



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presented by the Examiner. The Appellant therefore submits that the final rejection of his claims 1-5, 7-18 and 20-22 is improper under 35 USC §103.

The reversal of the final rejection is respectfully solicited from the Board.

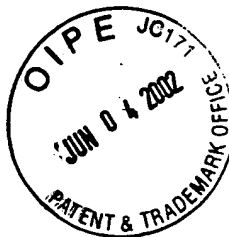
Respectfully submitted,

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CLAIM APPENDIX

1. A front-side repairable TFT-LCD assembly comprising:  
a TFT-LCD equipped with a first multiplicity of buslines,  
at least one repair line positioned outside of and in  
parallel with a circuitry on said TFT-LCD, said at least one repair  
line intersects said first multiplicity of buslines with an  
insulating layer thereinbetween, and

a black matrix film coated on a glass substrate  
positioned juxtaposed to said repair lines and buslines, said black  
matrix film having a second multiplicity of apertures formed  
therethrough each corresponding to a location where one of said at  
least one repair line intersects said first multiplicity of  
buslines allowing a laser to pass therethrough for welding a repair  
line to a busline.

2. A front-side repairable TFT-LCD assembly according  
to claim 1 further comprising at least three spaced-apart and  
parallel repair lines positioned outside of and in parallel with a  
circuitry of said TFT-LCD.

3. A front-side repairable TFT-LCD assembly according to claim 1 further comprising at least five spaced apart and parallel repair lines positioned outside of and in parallel with a circuitry of said TFT-LCD.

4. A front-side repairable TFT-LCD assembly according to claim 1, wherein said first multiplicity of buslines comprises gate buslines and data buslines.

5. A front-side repairable TFT-LCD assembly according to claim 1, wherein said glass substrate having said black matrix film coated thereon is used as a front cover in said TFT-LCD assembly.

7. A front-side repairable TFT-LCD assembly according to claim 1, wherein said second multiplicity of apertures formed in said black matrix film allows a laser beam to pass therethrough for severing a busline.

8. A front-side repairable TFT-LCD assembly according to claim 1, wherein said black matrix film is formed in a photolithographic/etching method.

9. A front-side repairable TFT-LCD assembly according to claim 1, wherein said second multiplicity of apertures formed in said black matrix film is used for laser repair after an array test or after a panel power-up test.

10. A method for fabricating a front-side repairable TFT-LCD assembly comprising the steps of:

providing a TFT-LCD equipped with a first multiplicity of buslines,

providing at least one repair line laid out around a circuitry on said TFT-LCD, said at least one repair line intersects said first multiplicity of buslines with an insulating layer thereinbetween,

coating a black matrix film on a glass cover plate in said TFT-LCD,

patterning said black matrix film and forming a second multiplicity of apertures therein each corresponds to a cross-over point where one of said at least one repair line intersects said first multiplicity of buslines,

mounting said glass substrate having said black matrix film patterned with a second multiplicity of apertures therein on said TFT-LCD as a cover plate, and

passing a laser beam through at least one of said second multiplicity of apertures in said black matrix layer to weld a repair line to a busline by fusing through said insulating layer.

11. A method for fabricating a front-side repairable TFT-LCD assembly according to claim 10 further comprising the step of patterning said black matrix film by a photolithographic method.

12. A method for fabricating a front-side repairable TFT-LCD assembly according to claim 10 further comprising the step of forming said second multiplicity of apertures in said black matrix film by an etching method.

13. A method for fabricating a front-side repairable TFT-LCD assembly according to claim 10 further comprising the step of passing a laser beam through at least one of said multiplicity of apertures in said black matrix film to effectuate a repair on said TFT-LCD.

14. A method for fabricating a front-side repairable TFT-LCD assembly according to claim 10 further comprising the step of testing said TFT-LCD in an array test in a panel power-up test.

15. A method for fabricating a front-side repairable TFT-LCD assembly according to claim 10 further comprising the step of providing at least three spaced-apart and parallel repair lines around a circuitry on said TFT-LCD, said at least three repair lines intersect said first multiplicity of buslines with an insulating layer thereinbetween.

16. A method for fabricating a front-side repairable TFT-LCD assembly according to claim 10 further comprising the step of providing at least five spaced-apart and parallel repair lines laid out around a circuitry on said TFT-LCD, said at least five repair lines intersect said first multiplicity of buslines with an insulating layer thereinbetween.

17. A method for fabricating a front-side repairable TFT-LCD assembly according to claim 10, wherein said first multiplicity of buslines comprises gate buslines and data buslines.

18. A method for fabricating a front-side repairable TFT-LCD assembly according to claim 10 further comprising the step of passing a laser beam through at least one of said second multiplicity of apertures in said black matrix layer to sever a busline or a gate line that is connected to a defective circuit in said circuitry.

20. A method for repairing a front-side repairable TFT-LCD assembly comprising the steps of:

providing a TFT-LCD equipped with a first multiplicity of buslines,

providing at least one repair line laid out around a circuitry on said TFT-LCD, said at least one repair line intersects said first multiplicity of buslines with an insulating layer thereinbetween,

coating a black matrix film on a glass substrate used as a cover plate for said TFT-LCD,

patterning said black matrix film and forming a second multiplicity of apertures therein each corresponds to a cross-over point where one of said at least one repair line intersects said first multiplicity of buslines,

mounting said glass substrate having said black matrix film patterned with a second multiplicity of apertures therein on said TFT-LCD as a cover plate,

testing said TFT-LCD in an array test or in a panel power-up test and locating at least one defective circuit in said circuitry, and

irradiating a laser beam through said second multiplicity of apertures in said black matrix film to effectuate a repair on said at least one defective circuit.

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21. A method for repairing a front-side repairable TFT-LCD assembly according to claim 20 further comprising the step of effectuating a repair on said at least one defective circuit by severing at least one busline that is connected to said at least one defective circuit.

22. A method for repairing a front-side repairable TFT-LCD assembly according to claim 20 further comprising the step of effectuating a repair on said at least one defective circuit by welding at least one repair line to at least one busline for bypassing said at least one defective circuit.